

The Teachers' File

THE EPIC OF EVOLUTION: A COURSE DEVELOPMENTAL PROJECT

by Russell Merle Genet

Abstract. The Epic of Evolution is a course taught at Northern Arizona University. It engages the task of formulating a new epic myth that is based on the physical, natural, social, and cultural sciences. It aims to serve the need of providing meaning for human living in the vast and complex universe that the sciences now depict for us. It is an interdisciplinary effort in an academic setting that is often divided by specializations; it focuses on values in a climate of relativism; and it concentrates on an enterprise for which there are few textbooks at hand. The course is presented in three segments: the cosmos before humans appeared, the human phenomenon, and scenarios for the future of evolution.

Keywords: epic of evolution; myth; story.

WHAT THE EPIC OF EVOLUTION IS

Throughout recorded history—and presumably well before historic times—we humans have had our stories, our myths, our religious epics. Human universals, they have provided us with a sense of belonging, a connectedness to others, to nature, to the universe itself. In recent years we have come to share a common, cross-cultural understanding of our evolutionary journey, which links each and every one of us together, to all other life forms, and back through time, to the very beginning of the universe. This shared story, the epic of evolution, also ties us to the future, for our very understanding of the epic may itself influence the story's outcome.

The epic of evolution is both science and story: science because it is based on our understanding of how the universe, life on earth, and we

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ourselves came to be; story, not only because the storytellers must be selective in the science they portray (all of science won't fit within a human mind) but because the epicists tap our natural love for a good plot, a well-told tale. The epic is story because, unlike collective science, epic artists render individualistic interpretations. Stories by committee fare poorly.

The epic of evolution is, simultaneously, both scientifically objective and culturally relative. Although based on objective science, the telling of the epic, of any story, is from a particular cultural heritage. Also, how the epic is portrayed depends on the intended audience: teachers and their students, individual questers on their own personal searches for human meaning in a vast universe, environmentalists working together to shape the story outcome, or religious leaders and laity contemplating the epic's spiritual meaning. For some audiences, such as science students, the sense of religion must be subtle, whereas for others, such as the religious laity, the sense of science must be subtle.

Good stories need closure. The beginning of a new human chapter of the story is upon us as our kind comes to terms with a finite planet. Gloomy storytellers foresee a bust, technophiles envision our spread throughout the galaxy, and environmentalists long for a return to Eden. Some versions of the epic contrast the alternatives facing humanity.

The epic of evolution not only unifies the natural and social sciences; it bridges science and religion, fact and value, and it smoothly blends the scientifically objective with the culturally relative. The epic also addresses humanity's most pressing questions. If as a species we are to understand and solve our common problems, if we are to guide our story's unfolding, we need to understand, in the deep and human way that only story can convey, both our evolutionary past and our future options. We need the epic.

WHY THE EPIC OF EVOLUTION IS RARELY TAUGHT

With so much going for it, one might think that the epic of evolution would be the most popular of all university courses, but in fact, the epic is rarely offered. The astounding success of modern universities results from their "divvying up the pie" of knowledge into thin slices, thus fostering isolated areas of scholarly expertise among their faculties. Subject-matter experts are not only segregated into departments, but they owe their allegiance to various, often opposing, viewpoints. Natural and social scientists rarely communicate with each other. Laboratory scientists and postmodern humanists might as well be from different planets—they can not even agree on reality itself. Any course that crosses these almost-sacred boundaries invites fire from all sides.

Furthermore, there is basic disagreement on what humanity's future ought to be, assuming that we are able to influence our own story.

Engineering, business, and much of science aim toward a brave new world of endless technological progress, but this is a future from which many humanists and most environmentalists shrink in abject horror. They would have us strive for a greener, more spiritual future.

Finally, even if the above difficulties could be overcome, any would-be instructor is faced with a dearth of epic textbooks, study guides, and other instructional aids. Organizing a course from scratch in one's own area of expertise is daunting enough; organizing a course that encompasses a plethora of disciplines is well nigh impossible. Little wonder that the epic of evolution is rarely taught at modern universities!

OVERCOMING THE DIFFICULTIES: A PROPOSAL

Although expert scholarship could be maintained by team teaching, with each expert contributing from his or her own small area of knowledge, the goal of an integrated, well-told story would be lost. The responsibility of the epicist lies in synthesis, in integrative scholarship, in providing an easily understood story. Although it is entirely proper that most faculty should be highly focused experts, the very name *university* suggests that a few "experts" on pulling all the pieces together would be appropriate. The epic of evolution is just an extreme case of such scholarship of integration.

The epic of evolution neatly transcends the normal dichotomy between the sciences and humanities with its own dichotomy of a strict scientific base but culturally relative telling. If scientists were to agree that the epic's evolutionary contents are correct, and humanists were to concur that it is presented in a thoughtful, artistic manner, sensitive to the values and nuances of the various cultures represented by the students, how could anyone ask for more?

Contradictory futures can be incorporated in an even-handed way by simultaneously championing alternative outcomes. Stark contrasts spark passionate discussions.

The current dearth of epic textbooks and other course materials can be overcome through cooperative development and sharing. I have been developing an epic of evolution course, including a textbook and other course materials, with the goal of sharing these materials with others. (Please contact me for details.) I currently have a first-cut, core story that I hope is both scientifically correct and humanly interesting, and it will be taught at Northern Arizona University in 1998. This "play" has been divided into three acts and fifteen scenes to correspond with the number of weeks available for instruction in a typical semester. The evolutionary story, however, is just one of three equal components in the course. The second component is made up of guided discussions on the human, even religious, meaning of science's evolutionary story. The third component is the creation, by the students themselves, of their own rendition and

interpretation of the epic of evolution. Students will cooperatively coordinate their “term papers,” and so collectively they will form their own version of the epic of evolution. The final “oral exam” will be a presentation of their own version of the epic. A revised version of the course is planned for 1999, and suggestions for improvements and additions that would make this course and its supporting material more useful to others would be most welcome.

STORY SYNOPSIS

We are the life that knows how it came to be, that can contemplate its future. We are the universe become conscious of itself. For 4 billion years life never even bothered to ask, and then—just 40 thousand years ago—life finally popped the question. It was only yesterday, however, that we grasped the answer: we—all life—evolved and will continue to do so. Wakened suddenly from our 4-billion-year slumber, our millennial stirrings, we find ourselves in the midst of an explosion. At the precise moment we have awakened, have come to know, we appear to be either life’s fool, accelerating toward the brick wall of planetary finiteness, or life’s clever revolutionary, headed toward the stars, or a sadder but wiser species yearning for Eden. As we struggle to become fully awake, we are not yet sure which it is—the fool, Captain Kirk, or a new Adam and Eve—but we suspect that our self-assessment could, in itself, make a decisive difference.

After all these eons of not knowing, what a tragic irony it is that the knowing itself is in jeopardy as soon as it appears. Coincidence it is not, however, for it was our very stirrings, our awakening, that set off the explosion, that launched our blitzkrieg upon other still-sleeping life. This three-act course is the story of how the universe and life on earth evolved, of how one species—our own—came to ask and then to know, and what the possible consequences of this knowledge might be.

ACT I: COSMOS AND LIFE BEFORE HUMANITY. Created in the curtain-opening flash of the Big Bang, our universe immediately began evolving as raw energy condensed into subatomic particles; these evolved into nuclei and, eventually, into galaxies and stars. Forged in the interior of exploding stars, atoms on the surfaces of properly situated planets formed complex molecules which, adding further layers of complexity, evolved into the dazzling array that is life on earth today.

ACT II: THE HUMAN PHENOMENA. Our ancestors, caught in the rapidly disappearing forests of East Africa, drew on their tool-making chimpanzee heritage to forge a new living on the open savanna. Cultural traditions accumulated ever so slowly at first, but with the rapidly

snowballing knowledge that began forty thousand years ago, we quickly mastered other life and, only yesterday, discovered how we came to be, discovered evolution itself. But our burgeoning knowledge of how this world works has ignited a firestorm that, if not properly confined and directed, could sweep us all to oblivion.

ACT III: FOUR EPIC FINALES. What is our future? Following the natural evolutionary path, will our boom be followed by an even faster bust? Or will our descendants, far from crashing, creatively overcome all obstacles and inherit the galaxy? Will our numbers increase until there is standing room only? Or, will we realize that huddling by the billions like ants in perpetual contact just is not our “chimpanzee thing”? Will we defy the edict to “be fruitful and multiply” and, for the first time in 4 billion years, apply self-restraint, sharply reduce our numbers, and return to the Garden of Eden?

SCENE-BY-SCENE COURSE OUTLINE

BEFORE THE CURTAIN OPENS:

EPICS—THE ROLE OF STORY IN HUMAN CULTURE

Story. Humanity has always defined itself with its stories, its myths, its grand religious epics. “To forget our story,” suggests cosmic storyteller Brian Swimme, “is to go insane.” Joseph Campbell suggested that “science is the only myth powerful enough for our modern age.” With one foot in the sciences and the other in the humanities, the epic of evolution is unique among the stories we tell ourselves.

Meaning. Why are we humans so attracted to story? Is science degraded or enhanced by its telling as a story? Readings:

Connie Barlow, *Green Space, Green Time: The Way of Science*.

Joseph Campbell with Bill Moyers, *The Power of Myth*.

Loyal Rue, *Everybody's Story: Wising Up to the Epic of Evolution*.

ACT I: COSMOS AND LIFE BEFORE HUMANITY

SCENE 1: COSMOS—FROM THE BIG BANG TO PLANETS GALORE

Story. Born in a flash of raw energy, the universe rapidly evolved as it expanded and cooled. Matter that had cycled through stars—as they played out their billion-year life cycles—ended up as planets like Earth and beings like you and me. We are stardust. Readings:

Brian Swimme, *The Hidden Heart of the Cosmos*.

Brian Swimme and Thomas Berry, *The Universe Story*.

Meaning. Is a God-created universe compatible with science's story?

Readings:

- John Barlow and Frank Tipler, *The Anthropic Cosmological Principle*.
 John Templeton and Robert Hermann, *The God Who Would Be Known: Revelations of the Divine in Contemporary Science*.

SCENE 2: LIFE ON EARTH—AN EVOLUTIONARY HIERARCHY OF COMPLEXITY

Story. The surfaces of appropriately situated planets are conducive to complex chemical reactions. Self-replicating reactions led, via an evolutionary process extending over 4 billion years, to the diverse complexity that is life on earth today. Readings:

- Connie Barlow, *Evolution Extended: Biological Debates on the Meaning of Life*.
 Peter Corning, *The Synergism Hypothesis: A Theory of Progressive Evolution*.
 Richard Dawkins, *River out of Eden: A Darwinian View of Life*.
 John Maynard Smith and Eors Szathmary, *The Major Transitions in Evolution*.

Meaning. Could complex beings, such as ourselves, really have evolved or were we designed? Is evolution going anywhere? Is there evidence of purpose? Readings:

- Ursula Goodenough, *The Sacred Depths of Nature*.
 John M. Templeton, ed., *Evidence of Purpose: Scientists Discover the Creator*.

SCENE 3: CHIMPANZEES AND BONOBOES—MASTERS OF TOOLS AND MACHIAVELLIAN INTRIGUE

Story. Humans, we used to think, were the only makers of tools, the only cultural species. Recent field studies, however, have established that our nearest relatives, the chimpanzees and bonobos, also exhibit these and many other "human" behaviors. Although chimpanzee society is dictatorial and male dominated, bonobo society is egalitarian and female dominated. (Feminists please take note!) Readings:

- Jane Goodall, *In the Shadow of Man*.
 Frans de Waal and Frans Lanting, *Bonobo: The Forgotten Ape*.

Meaning. Are we, in reality, just a third species of chimpanzee? Should legal rights be extended to chimpanzees? Do they have souls? Reading:

- Frans de Waal, *Good Natured: The Origins of Right and Wrong in Humans and Other Animals*.

SCENE 4: ANTS—THE PERFECT LITTLE COMMUNISTS

Story. Humans, we used to think, were the only species to herd other animals and raise crops. Ants do all this and more. Concentrated into cities of millions, ant colonies endlessly engage one another in ruthless, all-out warfare. As Bert Holldobler and Edward Wilson suggest, “If ants had nuclear weapons, they would probably end the world in a week.” Readings:

Bert Holldobler and Edward Wilson, *Journey to the Ants*.
 Erich Hoyt, *The Earth Dwellers: Adventures in the Land of Ants*.

Meaning. Are ants more organized, more successful, than chimpanzees? Are modern civilizations really antlike? In what ways?

ACT II: THE HUMAN PHENOMENA

SCENE 1: HOMO. THE CHIMPANZEES WHO WERE THROWN TO THE LIONS

Story. Trapped in the dwindling pockets of East African forests, some “chimpanzees” learned how to “mix it up” with lions and hyenas on the savanna. Lacking sharp teeth or claws, they drew on and enhanced the venerable chimpanzee cultural traditions of tool making, hunting, and sophisticated social organization. Readings:

Richard Leakey, *The Origin of Humankind*.
 Steven Stanley, *Children of the Ice Age*.

Meaning. How solid is the evidence for our descent from a common ancestor with chimpanzees? Was the emergence of *Homo sapiens* an improbable fluke, or was it somehow guided or inevitable? Reading:

Terrence Deacon, *The Symbolic Species: The Co-evolution of Language and the Brain*.

SCENE 2: CULTURAL EXPLOSION—THE ORIGINS OF ART AND RELIGION

Story. Some forty thousand years ago, our species began a creative frenzy the likes of which earth had never seen before: cave paintings, musical instruments, body decorations—all seemingly out of nowhere. The cause of this Big Bang of cultural evolution remains hotly debated, although its effects are clearly evident planetwide. Readings:

Michael Corballis, *The Lopsided Ape: Evolution of the Generative Mind*.

John Pfeiffer, *An Inquiry into the Origins of Art and Religion*.

Meaning. Did art and religion exist prior to forty thousand years ago? Were the Neandertals religious? Did *Homo sapiens* exterminate them?

SCENE 3: CIVILIZATIONS—THE CHIMPANZEES WHO BECAME ANTS

Story. Successful big-game hunters, humans dramatically increased in number as game plummeted. Caught in a food bind, they resorted to antlike agriculture. Although more work than hunting and gathering, the sedentary lifestyle and small surpluses led to civilizations, writing, and the modern era. Readings:

Alfred Crosby, *Ecological Imperialism: The Biological Expansion of Europe*.

Jared Diamond, *Guns, Germs, and Steel: The Fates of Human Societies*.

Meaning. Did writing, libraries, and schools create a new form of life? Would we—would the planet—have been better off without civilizations? Reading:

Russell Genet, *The Chimpanzees Who Would Be Ants: The Evolutionary Epic of Humanity*.

SCENE 4: MACHINES—THE GEESE WHO LAID THE GOLDEN EGGS

Story. The surpluses generated by the toiling masses were always meager; the elite were few—until the machines. Tapping a bonanza of hidden energy, the gargantuan surpluses generated by machines created entire societies of elites. Every silver lining has its cloud, however. Machines (and consumers) have their dark side. Readings:

George Basalla, *The Evolution of Technology*.

Joel Mokyr, *The Lever of Riches: The Co-evolution of Humans and Machines*.

Meaning. On balance, have machines benefited humanity? Do machines have their own evolutionary pathways? Are they really under our control? Readings:

Ian Barbour, *Ethics in an Age of Technology*.

Bruce Mazlish, *The Fourth Discontinuity: Coevolution of Humans and Machines*.

SCENE 5: SCIENTISTS—THE CURIOUS CATS WHO PRIED OPEN PANDORA'S BOX

Story. Skeptical minds born of rhetoric, open debate, and eventually experiment unlocked the secrets of deep time, a vast universe, and that strangest of all human stories, the epic of evolution. Also unlocked were the secrets of nuclear bombs, DDT, and freon. As with machines, the silver lining of scientific knowledge has its cloud. Readings:

Alan Cromer, *Uncommon Sense: The Heretical Nature of Science*.

Robin Dunbar, *The Trouble with Science*.

Roger Shattuck, *Forbidden Knowledge: From Prometheus to Pornography*.

Lewis Wolpert, *The Unnatural Nature of Science*.

Meaning. Has science cornered truth, or is it just another culturally-relative way of knowing? Readings:

Ian Barbour, *Religion and Science: Historical and Contemporary Issues*.

John Brooke, *Science and Religion: Some Historical Perspectives*.

David Lindberg and Ronald Numbers, eds., *God and Nature: Historical Essays on the Encounter Between Christianity and Science*.

ACT III: FOUR EPIC FINALES

SCENE 1: BOOM AND BUST—

HUMANITY'S EXTINCTION LIBERATES EARTH

Story. Are we just a flash in the pan, an out-of-control cultural explosion soon to crash to oblivion? Are our environmental initiatives mere palliatives as a human tidal wave of destruction sweeps the planet? Are we a pox the planet would be better off without? Earth has had its past mass extinctions but never one brought on by a single species. Readings:

Isaac Asimov, *A Choice of Catastrophes*.

Richard Leakey and Roger Lewin, *The Sixth Extinction*.

Meaning. Is humanity an out-of-control disaster that will ruin planet earth? Are earth's ecosystems fragile or robust? Reading:

Niles Eldredge, *Dominion: Can Nature and Culture Co-Exist?*

SCENE 2: ROBOTIC TRIUMPH—OUR MIND CHILDREN

INHERIT THE GALAXY

Story. Are we a new evolutionary force, the hottest thing to hit the planet since life itself? Are we destined to reshape the earth and then, shades of Captain Kirk, to take on the galaxy? Or will that adventure be left to our robotic descendants, our mind children? Readings:

Michio Kaku, *Visions: How Science Will Revolutionize the 21st Century*.

Hans Moravec, *Mind Children: The Future of Robot and Human Intelligence*.

Meaning. Will computers take over? Have they already? Will humanity eventually spread throughout our galaxy? The universe? Reading:

Gregory Stock, *Metaman: The Merging of Humans and Machines into a Global Superorganism*.

SCENE 3: SUSTAINABLE BIOSTARS—MODEST SELF-RESTRAINT
AVOIDS THE CRASH

Story. With proper financial incentives and green-friendly technology, we can work together to bring that rogue ape, humanity, into line with the realities of a finite planet. Together, we can forge a planetary ethic for all humanity. Readings:

Lester Brown, *State of the World*.

Paul Kennedy, *Preparing for the Twenty-first Century*.

Meaning. Do we really need ten million different species of animals? Wouldn't one million do? Can we take a new view of economics? Reading:

Herman Daly and John Cobb, *For the Common Good*.

SCENE 4: CHIMPANZEE PARADISE—HIGH-TECH GARDEN OF EDEN

Story. Why billions of humans? Wouldn't we be better off with just millions? We could then rejoin earth's other creatures as just plain citizens. One with nature again, our chimpanzee heritage regained, we could, on the side, still enjoy the benefits of a few unobtrusive, green-conscious machines. Reading:

Robert Heilbroner, *Visions of the Future*.

Meaning. Could we sharply reduce our population without draconian measures? Do we need to take charge of and protect earth from humanity? Reading:

Gunther Stent, *The Coming of the Golden Age*.

AFTER CURTAIN CLOSE: WHAT DOES IT MEAN?—FUTURES MOST LIKELY
AND DESIRABLE

Meaning. What is the human meaning of the epic of evolution? Is our most likely future, as many would believe, a crash to oblivion? What future, likely or not, should we work toward: the adventure of *Star Trek*? the sanity of humanity under control? or our instinctive Garden of Eden? Which future do you think is most likely? Which future do you think is most desirable? How might we make undesirable futures less likely? desirable ones more likely? Readings:

John Haught, *Science and Religion: From Conflict to Conversation*.

Edward Wilson, *Consilience*.